

THE NATURAL VEGETATION OF OHIO

II. THE PRAIRIES

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INTRODUCTORY STATEMENT.

It is well known that many treeless areas existed in Ohio before white settlement. These areas, of various ecological character and usually restricted in size, were in a few cases fairly extensive—embracing from fifty to one hundred square miles. The term “prairie” was rather generally applied to them, although more exact terms were not wanting. Like the various forest associations, these treeless areas have played an important rôle in influencing industrial and cultural phases of human life in Ohio (1). The present paper is an attempt to reconstruct such areas, now destroyed or obscured by secondary successions induced by white men. In this as in the preceding paper on the virgin forests of Ohio (2) the question of succession has been intentionally postponed.

The sources consulted in this work are essentially those drawn upon for the preceding paper, to wit, field notes of original surveys, county and other local histories, accounts of travelers and pioneers, and occasional papers by the early naturalists who knew this region. Taken together all of these supply a fair system of checks. In many cases also the writer's own field observations have been of service, since isolated remnants are still to be found along roadways and elsewhere.

In addition to the friends whose assistance has been earlier acknowledged, the writer wishes to express his gratitude to Mr. Emory C. Leonard of the U. S. National Herbarium, who kindly consented to check the numerous synonyms in the floristic lists. Thanks are also due to Miss Clara G. Mark for suggestions in relation to physiographic problems.

WORDS USED TO DESIGNATE TREELESS AREAS.

As stated above the term “prairie” in the early records meant a treeless area, generally grassy, but sometimes covered with low shrubs or brush. It might be wet or dry. The following terms seem to have been somewhat narrower in their meaning.

Wet Prairie.—Equivalent to wet meadow, generally consisting of sedges, rushes, and grasses, e. g., *Phragmites* and *Calamagrostis*. It was sometimes extended to include cattail and pickerel weed associations, and not infrequently used to indicate bog meadow, i. e., “cranberry prairie.”

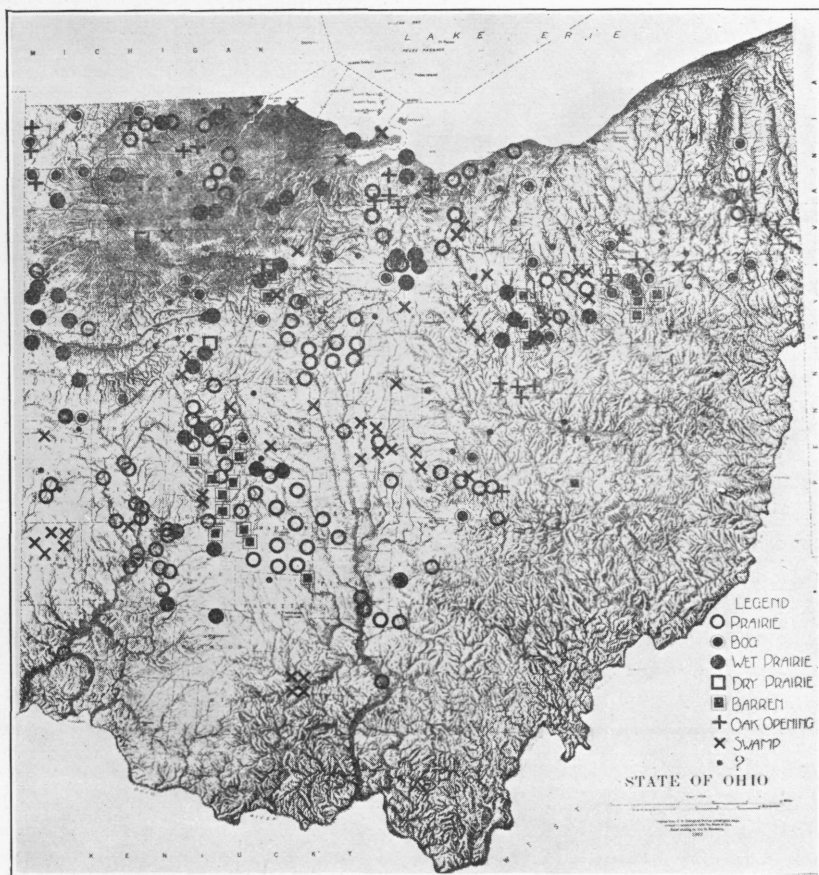


Figure 1.

Position of the treeless areas of natural vegetation in Ohio. Based upon records made between 1750 and 1850, and checked in many cases by field observations. Symbols indicate character as designated in early records.

Dry Prairie.—One in which no standing water was found; most frequently the marginal zone of a wet prairie if the nearby trees were sparse; in some cases merely the late summer aspect of a normally wet prairie; at times perhaps the more or less direct result of fire.

Bog.—Largely in the modern sense, referring to a depression filled or filling with peat, the product of a boreal flora.

Swamp.—Habitat marked by standing water for most of the year, occupied either by herbs (aquatics such as cattails and pickerel weed, etc.), shrubs (small willows, alders, buttonbush, etc.) or trees (ash-elm, tamarack-alder, etc.).

Swale.—Apparently a small swamp.

Marsh.—An herbaceous swamp, generally an extensive one; also used specifically to designate the bog meadow, e. g. "cranberry marsh."

Barren.—An habitat in which tree growth is scrubby, defective, or even absent; used alike in cases of deficient and excessive soil moisture.

Oak Opening.—Essentially oak savannah, the oak forming open thin groves, or being present as scattered clumps or individuals, with the (generally lower) ground between occupied by grasses and other herbaceous vegetation.

EXPLANATION OF THE MAP.

The foregoing glossary is not ideal, but it represents just what we have for our work. With the accompanying map, Fig. 1 (1922 U. S. G. S. relief map of Ohio) will be found a key to the conventional signs used. These signs, centered upon the habitat they designate, are a key to position and quality, but not to size of habitat. It will be noted that "swale" and "marsh" have not been used, but the remaining terms are used in as near their modern restricted sense as available descriptive records will allow. Upon this basis selection has been made between synonyms where possible. In certain cases it is not clear whether two terms were intended as synonyms—they may have referred to two adjoining but differing associations or to different seasonal aspects of the same area. In these and all other cases of too meagre information the map has entered upon it just what the records say, and with this we must rest content. It will be noted that there is a symbol for questionable or uncertain cases which has been freely employed.

It should be explained that all of the "swamps" marked in Preble County and several of those in Delaware, as well as the "bog" on the lake shore in Lake County were wooded, and not at all treeless. There has been no attempt to map all bogs—chiefly those are shown whose bog-meadow stage earned them at one place or another in the records the name of "prairie."

The bogs of Ohio have, of course, been studied in detail by Dachnowski (3) to whose work the reader is referred.

While most of the symbols represent patches of small area there seem to have been no less than five regions in which the prairies were of considerable size in the aggregate. These coincide with areas marked "Oak" in the virgin forest map (2). First, there was the sandy region of Fulton, Lucas, and Wood counties; second, the thin-soiled limestone region of Sandusky, Erie, Seneca, and Huron; third, the sandy region of oak openings in Wayne and Stark counties; fourth, the Wyandot and Sandusky Plains of Wyandot, Marion, and Crawford counties; fifth, the Darby Plains of Union, Madison and adjacent counties. If to these we could add the marginal wet meadows along Lake Erie, the grass-covered depressions within the Erie Basin and upon the divide, the chains of "cat-head" prairies in the filled valleys of the two Miamis, the Scioto, and the Licking, the resulting total would at least cover two average counties. Fifteen hundred square miles represents a rough, but conservative estimate of the total natural treeless area in Ohio.

PRAIRIES AND PHYSIOGRAPHY.

Comparing the position of the treeless areas as marked in Fig. 1 with the physiographic boundaries in Ohio shown in Fig. 3 of the preceding paper of this series (2), certain general correlations at once appear. These are, briefly, as follows:

1. Treeless areas were practically absent from the unglaciated portion of the state.
2. They occurred all along the Ohio-Erie Divide, but in groups rather than at random.
3. These groups swung away to the southeast of the Divide in a series of crescent-like extensions.
4. North of the Divide the Erie Plain contained a series of curving groups, the innermost being along the present margin of Lake Erie.

From the fact that prairies were found only in the glaciated region one is justified in expecting a relation between glaciation and prairies. The parallel crescentic arrangement of these treeless areas suggests at once a correlation with the system of glacial moraines, (see Fig. 2). In most cases radii of these arcs approximate the direction of glacial movement, as can be verified by studying a map of the glacial striæ in Ohio. Like

the accompanying Oak of the virgin forest, then, the prairies in general occupied the regions near the apices of the glacial fronts, where outwash and ponding were the rule. As concrete examples of such habitats may be cited pondings in Mercer and



Figure 2.

Relation of the natural treeless areas of Ohio to the system of moraines as traced by Leverett in U. S. G. S. Monograph 41. Note the correlation with regions of glacial outwash and ponding. Consult Fig. 1 for symbols not visible here.

other counties, flats in Marion County, and filled preglacial valleys, whether silted and ponded as along the Miami, or gravel-filled and presumably overdrained, as in Pickaway County. Unlike the Oak the prairies occupied the actual depressions, although in their dryer phase they extended upward

towards and even into the Oak on higher ground. Besides these generally apical positions, prairie was found associated with Oak in the sand dune and pan of Lucas and Fulton counties, and the limestone ridge and shallow basin of Sandusky County.

Apart from the dryer ridges or marginal zones and the coarse gravel beds most of the prairies must at one time have been sites of either definite lakes, or seasonal ponding. There is no reason to doubt that Ohio has metamorphosed through the familiar postglacial stages now found farther north, in Michigan, Minnesota, and Canada. Orton (4) found evidence of a former extensive shallow lake upon the region occupied by the Darby Plains in Union and Madison counties. Numerous soil borings made by the writer upon former prairie sites have shown a layer of blue hardpan, generally close to the surface. Moreover, a large number of these areas are shown by the sheets of the Topographic Survey to possess a fall of considerably less than ten feet to the mile.

SURVEY OF PRAIRIE HABITATS.

Within the Erie Plain proper were found four distinct zones or belts of treeless areas, corresponding to the present or 5th beach of Gilbert (5), the 4th, 2nd, and 1st. The 3rd beach was not so well marked in this way, (cf. Fig. 3).

Two of these curving beaches, the 2nd and 4th, ran into sand hills at their northern end, resulting in oak openings on the dunes and wet meadows in the pans. Bogs were present in the two oldest beach zones but not in the younger ones. At their eastern end the beaches converge somewhat as they approach and cross the bare limestone ridge which runs southward from Sandusky Bay. Upon this ridge were found open groves of scrubby oak, while the shallow soil upon its flanks showed prairies, wet in some cases, as at Castalia, and probably dry in others.

Between the sandy northern and rocky eastern ends the beach lines curve across the broad flat Maumee Valley formerly occupied by Lake Erie—the Black Swamp Region. Here at intervals were prairies, generally wet. In Wood County, (6a), Van Wert, (6b), and Huron counties especially these prairies had the shape of old estuaries or baymouths similar to the present Sandusky Bay, for example.

The Erie Plain corresponds closely to the Erie Basin, save at the eastern end, where the present Ohio-Erie Divide lies some distance south of the escarpment near the lake which separates Erie Plain from Alleghany Plateau. Upon the intervening strip



Figure 3.

Relation of natural treeless areas of Ohio to preglacial drainage lines and postglacial lakes. Shores of postglacial lakes in Erie Basin shown in white; preglacial valleys in wide black (approximations in narrow black). White arrows indicate beach sand, black arrows small postglacial lakes. See text for further explanation.

of plateau prairies were quite lacking. Along the divide, however, prairies abounded, mostly being depressions or inadequately drained flats. These prairies of the divide fell into at least five distinct constellations or groups, each of which curved

away to south and east as already noted. These groups were found in Mercer, Hardin, Wyandot-Marion-Crawford, Ashland-Wayne, Wayne-Stark-Summit, with perhaps a sixth group in Portage-Mahoning and a seventh in Trumbull County. In at least Mercer, Ashland, Stark, and Wayne counties all or many of these wet prairies marked the course of deep, buried and silted preglacial drainage valleys, as is shown by Fig. 3. The position of preglacial drainage lines shown by this map is based upon various sources, including work by Read (7), Tight, Bownocker, et al. (8), Clark (9), and Tight (10).

Moving southward from the divide there were left four principal regions of prairie—Miami Valley, Miami-Scioto uplands (Darby Plains), Scioto Valley, and Licking Valley. All of these regions coincided at least in part with great preglacial valleys (Fig. 3), now silted or gravel-filled. That the Darby Plains represented a shallow postglacial lake site has already been mentioned. A somewhat isolated prairie in northern Clinton County is known to lie in a buried valley.

In brief then, there were prairies within the Erie Plain, along old shore lines and in ancient bays; prairies along the Ohio-Erie Divide, many of which were within buried valleys or the sites of postglacial lakes; and prairies in the glaciated Ohio Basin, of which the same statement may be made. In the face of such correlations, any serious attempt to invoke fire as a prime cause of Ohio prairies must vanish, although fire doubtless played a rôle in their history. That these more detailed correlations are not inconsistent with the general morainal relations pointed out earlier, a little reflection will show. The major outlines of glaciation were fundamentally affected by preglacial topography, as were the details of outwash channels, etc. This point, made clear for Ohio by Read (7) and others is reiterated because of the frequency with which explanations involving "accidental" pondings and other topographic features were encountered early in this study. *There have been no accidents.* In fact, so striking is the relation between preglacial topography and natural vegetation that the writer does not hesitate to express his belief that a great preglacial valley will probably be found running northward through Champaign, Logan, Hardin and Hancock counties and another northwestward through Marion and Wyandot counties.

GENERAL APPEARANCE OF THE ORIGINAL PRAIRIES.

A portrait of the prairies is to be found in Cincinnatus (11). Evidently a composite account, it applies well to Ohio conditions. Grasses, including *Andropogon furcatus*, *Spartina*, *Eragrostis*, were said not to be turf formers. Flowers were abundant, but represented a profusion of individuals rather than species. Early aspects showed numerous legumes, *Baptisia*, *Desmodium*, *Psoralea*, *Dalea*, *Petalostemon*—some Rosaceæ, e. g., *Rosa*, and *Spiraea*, while from July to October Compositæ outnumbered all other orders. During this aspect *Actinomeris*, *Coreopsis*, *Helianthus*, *Rudbeckia*, *Lepachys*, *Echinacea*, *Liatris*, *Silphium*, etc., were conspicuous. Under conditions of settlement *Phleum*, *Agrostis*, and *Poa* were rapidly replacing all native plants.

From among numerous non-technical accounts which are available a few have been selected below for the graphic impression they give of the undisturbed treeless areas.

Christopher Gist, exploring southeast Ohio in 1751 (12) reported it full of beautiful natural meadows covered with wild rye, blue grass and clover (!), abounding with turkeys, deer, elk, and especially buffalo. This was in January and February. In March, travelling along the Little Miami, he noted that the river continued to run through the middle of a fine meadow about a mile wide, "very clear like an old field and not a bush in it."

Pease, surveying the 6th meridian (13) in 1796, between what is now Geauga and Trumbull Counties, came "to an intervalle with grass, scattering trees, etc. * * * on this intervalle is elm, white oak, ash, white thorn, elder, the white and red meadow plumb trees full of fruit (Sept. 6), which is ripe and excellent of the kind * * * the grass here would make tolerable hay and is generally a good burthen * * * bottom (of adjacent stream) hard clay and gravel."

Mr. C. E. Custis, describing to the writer the prairie in northern Clinton County, said that his mother came there in 1803 and in riding to school she often found the grass as high as her horse and head. There were some scattering clumps of trees. Cattle frequently mired in the "lower" prairie. In 1869, when Mr. Custis bought his present place, the "upper" prairie had been slightly drained and was covered with wild rose bushes, grasses, and some wild plums.

Cyrus P. Bradley (14) travelling through Ohio in 1835, says concerning the Pickaway Plains, "Our farmer described with great enthusiasm the appearance of these plains when he first pitched his tent upon its border. A natural plain of from three to seven miles in extent, covered with a low wild plum producing a luscious fruit, and without a single tree in its whole extent to obstruct the view." Trees were later introduced. If one visits Pickaway Plains today and examines the walls of cellars and other excavations he learns that the whole is underlain by many feet of pure, coarse gravel.

The same traveller, proceeding from Marion to Sandusky, says "Our road lay through low prairies and wet of course. * * * Prairie land is not necessarily wet or low. * * * But the prairies we passed over today are what we might call meadows; very low and wet, incapable of being drained, in a state of nature, unsusceptible of improvement. They are used for grazing and are exceedingly profitable. * * * In one instance we turned from the road and waded through the long grass of the prairie for miles, preferring a foot of unadulterated water, for it stood to that depth on the surface of the ground, to as great or greater depth of mud. * * * I shall never forget my ride across those gloomy unhealthy prairies which produce nothing but long grass, horned cattle, disease, mosquitoes, and rattlesnakes. One species of meadow grass was shown to me which is given the singular cognomen of Roman Catholic Grass.* Why, I did not learn."

The historian of Madison County (15) records that it is "well authenticated that a great portion of Madison County was originally covered with water most of the year. The first settlers called these lands barrens and looked upon them as utterly unfit for farming purposes. * * * The prairies consisted of level stretches of country covered with sedge-grass, and dotted here and there with patches of scrubby burr-oak growing upon the highest points of land. The sedge-grass grew to an enormous height, sometimes sufficient to hide man and horse when travelling through it; but [was] very nutritious for stock. * * * Nearly every autumn prairie fires swept over the country, destroying everything in their path. * * * But * * * these fires grew less frequent. * * * Timber on the east bank of the streams was always

**Hierochloa odorata* is native to Ohio, but is not listed by Schaffner (17) for the counties between Marion and Sandusky.

the largest, as these fires generally ran from west to east. * * * The growth of the burr-oak on the prairies was impeded by these periodical fires, and the greater amount of the present timber * * * has grown up since." The same authority quotes at length from an early physician, Doctor Converse. In vivid if empirical description is emphasized the extent and variegated color of the prairies. Three species of grass seem to have been dominant, one doubtless *Phragmites*, on the lower portions; two apparently including *Andropogon* on the upper. Numerous dicots are mentioned, notably *Silphium terebinthinaceum*, *Helianthus* sp., also *Iris*, *Lilium*, etc.

To Mr. Ephraim Monnette, born about 1835 on the Sandusky Plains between Bucyrus and Marion, the writer is indebted for a keen and intelligent verbal description of this region. At Tobias, toward the center of the area was a "Big Spring" of about one acre, covered by a floating sod of "moss," under which were fish and in which cattle were often mired. This was a dependable source of water the year round, even in very dry times. Just what this "moss" was would be a very interesting thing to know, but there is now no way of learning. To the writer's knowledge there were a number of other ponds, spring-fed, in this district.

Higher than the ponds, but still very wet, were the "prairies" proper. Their chief grass was quite tall, grew in tussocks, and possessed a "frizzly" head, on top of a hollow jointed stem. This was certainly *Phragmites*. Duckweeds were also described unmistakably, while *Lobelia*, quaking asps, slippery elm and "p—elm" were designated by name.

The so-called "plains" were dryer than the preceding. They bore strawberries in profusion, thorns, wild plum, puccoon root (white and yellow), wild turnips, indigo, rosin weed, sunflower, etc. The coneflower (*Rudbeckia*) made its appearance wherever the hogs rooted. In these dryer "plains" a shorter grass, described as having a defective or concealed head (possibly *Andropogon scoparius*) was dominant.

Upon the higher ridges or "islands" were oak, especially jack oak and hickory, also thorn, grape, hazel, (wild roses) and wild plums everywhere.

In early days these Sandusky Plains were drained by the Scioto, which was uncertain and feebly marked. Since lowering of the water table by drainage the stream has been growing and its channel deepening. Where the prairies have been disturbed,

blue grass has supplanted the original grasses. This phenomenon has been observed many times before and since.

If one today wished to see the conditions indicated in the preceding descriptions it would be almost impossible to find the fringing shrub zone of plum, rose, thorn, grape and hazel within Ohio, at least in its typical form. Very characteristic wet prairies can still be observed between Fremont and Port Clinton at the western end of Sandusky Bay, but the lowering of the water table has practically obliterated them inland. Drainage has not reacted so unfavorably upon the dryer phase, of which numerous examples can still be found in unbroken roadside sod throughout the former prairie regions of the state.

FLORISTICS OF THE ORIGINAL PRAIRIES.

In a publication now somewhat difficult to obtain (16) Riddell gives an extensive list of Ohio and other "western" plants, often specifying habitat and distribution—as they were known in 1835. Although settlement had progressed steadily at that date it is certain that many important prairie areas were still largely in their original condition. Riddell's list then is perhaps our best key to the floristics of the early prairies, but considerable scrutiny has been required to make it usable. All plants not definitely stated to be found in Ohio have been omitted, which accounts for the absence of *Andropogon furcatus*, *Calamagrostis* and a few other important forms which we know were present in great numbers. Plants from each type of treeless habitat have been grouped alphabetically. As far as possible all names have been conservatively modernized; where this has involved a change the old name used by Riddell will be found in parenthesis. In some cases where Riddell gave no authority the presumptive authority has been added. The numbers are his serial numbers, while asterisks mark those plants not listed in Schaffner's Catalog of Ohio Plants (16) or its supplements.

Plants of Ohio Barrens, after Riddell, 1835.

- 967 *Brauneria purpurea* (DC.) Britt. (*Rudbeckia purpurea* Willd.)
- 1078 *Cornus paniculata* L'Herit.
- 466 *Corylus americana* Walt.
- 1216 *Gerardia pedicularia* L.
- 736* *Ilex lanceolata* (Pursh) Chapm. (*Prinos lanceolatus* Pursh).
- 842* *Liatris gracilis* Pursh.
- 460* *Quercus ilicifolia* Wang. (*Q. bannisteri* Michx.)
- 459 *Q. prinoides* Willd. (*Q. chinquapin*).
- 448 *Q. stellata* Wang. (*Q. obtusiloba*).
- 461 *Q. triloba* Michx.
- 364 *Tephrosia virginiana* (L.) Pers. (*Galega virginiana*).

Plants of Ohio Bogs, after Riddell, 1835.

- 1436 *Cypripedium hirsutum* Mill. (*C. spectabile* Swartz).
- 1675* *Eleocharis capitata* (L.) R. Br. (*Scirpus capitatus* L.).
- 1684* *E. simplex* (Ell.) A. Diet. (*Scirpus simplex* Ell.).
- 1445 *Juncus acuminatus* Michx.
- 770 *Lobelia puberula* Michx.
- 769 *L. siphilitica* L.
- 1692 *Rhynchospora alba* (L.) Vahl.
- 1693 *R. glomerata* (L.) Vahl.
- 617 *Sarracenia purpurea* L.
- 757 *Vaccinium macrocarpon* Ait. (*Oxycoccus macrocarpus* Pursh).

Plants of Ohio Dry Prairies, after Riddell, 1835.

- 1462 *Allium cernuum* Roth.
- 1649 *Andropogon scoparius* Michx.
- 21 *Angelica atropurpurea* L. (*A. triquinnata*).
- 23* *A. lucida* L.
- 1105 *Apocynum cannabinum pubescens* (R. Br.) DC. (*A. pubescens* Brown).
- 1094 *Asclepias tuberosa* L.
- 1092 *A. verticillata* L.
- 870 *Aster laevis* L. (*A. cyaneus* Pursh).
- 860 *A. linariifolius* L.
- 886 (*A. miser* L.)
- 869 *A. novæ-angliæ* L.
- 880 *A. puniceus* L.
- 321* *Baptisia alba* (L.) R. Br.
- 967 *Brauneria purpurea* (DC.) Britt. (*Rudbeckia purpurea* Willd.).
- 941 *Cacalia atriplicifolia* L.
- 417 *Cassia chamæcrista* L.
- 536 *Ceanothus americanus* L.
- 827 *Cirsium discolor* (Muhl.) Spreng. (*Carduus discolor* Nutt.).
- 826 *C. muticum* Michx. (*Carduus glutinosus* Bk.).
- 20* *Coelopleurum actæifolium* (Michx.) Coult. & Rose. (*Ligusticum actæifolium*).
- 1128 *Convolvulus sepium* L.
- 75 *Delphinium exaltatum* Ait.
- 349* *Desmodium lævigatum* (Nutt.) DC. (*Hedysarum lævigatum*).
- 361 *D. obtusum* (Muhl.) DC. (*H. obtusum*).
- 362* *D. strictum* (Pursh) DC. (*H. strictum*).
- 1253* *Dyschoriste oblongifolia* (Michx.) Ktze. (*Ruellia oblongifolia* Michx.).
- 508 *Euphorbia corollata* L.
- 210 *Gaura biennis* L.
- 211* *G. parviflora* Dougl. (*G. mollis*).
- 1218 *Gerardia tenuifolia* Vahl.
- 963 *Helianthus giganteus* L.
- 960* *H. scaberrimus* Ell.
- 965 *H. strumosus* L.
- 957 *H. tracheliiifolius* Mill.
- 1113 *Houstonia longifolia* Gærtn.
- 165 *Hypericum prolificum* L.
- 1130* *Ipomoea macrorhizus* Michx. (*Convolvulus macrorhizus* Michx.).
- 937 *Kuhnia eupatorioides* L. (*K. critonia* L.).
- 972 *Lepachys pinnata* (Vent.) T. & G. (*Rudbeckia pinnata* Michx.).
- 344* *Lespedeza angustifolia* (Pursh) Ell.
- 340 *L. capitata* Michx.
- 345 *L. hirta* (L.) Hornem. (*L. polystachia*).
- 341 *L. violacea* (L.) Pers.
- 346 *L. violacea* (L.) Pers. (*L. divergens*).
- 838 *Liatris spicata* (L.) Willd.
- 839 *L. squarrosa* Willd.
- 772 *Lobelia spicata* Lam. (*L. claytoniana* Michx.).
- 223 *Oenothera fruticosa* L.

- 802 *Prenanthes altissima* L. (*P. ovata* Ridd.).
- 795 *P. aspera* Michx. (*P. illinoiensis* Pers.).
- 796 *P. racemosa* Michx.
- 566 *Ptelea trifoliata* L.
- 1284 *Pycnanthemum virginianum* (L.) Durand & Jackson. (*P. lanceolatum* Pursh).
- 970 *Rudbeckia fulgida* Ait.
- 968 *R. hirta* L.
- 969 *R. triloba* L.
- 1011 *Silphium laciniatum* L.
- 1010 *S. laciniatum* L. (*S. gumniferum* Ell.).
- 1009 *S. terebinthinaceum* L.
- 1012 *S. terebinthinaceum pinnatifidum* (Ell.) Gray. (*S. pinnatifidum* Ell.).
- 1006 *S. trifoliatum* L. (*S. ternatum* L.).
- 919 *Solidago rigida* L.
- 918 *S. tenuifolia* Pursh.
- 1651 *Sorghastrum nutans* (L.) Nash. (*Andropogon nutans* L.).
- 1398 *Tradescantia virginica* L.
- 1629 *Tridens flavus* (L.) Hitchc. (*Tricuspis seslerioides* Torr.).
- 1061 *Triosteum perfoliatum* L.
- 985 *Verbesina helianthoides* Michx. (*Actinomeris helianthoides* Eat.).
- 1068 *Viburnum pubescens* (Ait.) Pursh.

Plants of Ohio Marshes, after Riddell, 1835.

- 1390 *Alisma plantago-aquatica* L.
- 1738 *Aspidium thelypteris* (L.) Sw.
- 1000 *Bidens laevis* (L.) BSP. (*B. chrysanthemoides* Ell.).
- 68 *Caltha palustris* L.
- 106 *Cardamine hirsuta* L. (*C. virginica*).
- 11 *Cicuta bulbifera* L.
- 10 *C. maculata* L.
- 1127 *Convolvulus sepium pubescens* (Gray) Fernald. (*C. repens* L.).
- 1436 *Cypripedium hirsutum* Mill. (*C. spectabile* Swartz).
- 241 *Decodon verticillatus* (L.) Ell.
- 1161 *Dodecatheon meadia* L. (*D. integrifolium* Michx.).
- 1672 *Dulichium arundinaceum* (L.) Britt. (*D. spathaceum* Pers.).
- 1677 *Eleocharis intermedia* (Muhl.) Schultes. (*Scirpus intermedius* Muhl.).
- 1674 *E. palustris* (L.) R. & S. (*S. palustris* L.).
- 1678 *E. tenuis* (Willd.) Schultes. (*S. tenuis* Willd.).
- 1728 *Equisetum fluviatile* L. (*E. limosum* L.).
- 930 *Eupatorium perfoliatum* L.
- 1044 *Galium tinctorium* L. (*G. obtusum* Big.).
- 855 *Gnaphalium uliginosum* L.
- 734 *Ilex verticillata* (L.) Gray. (*Prinos verticillatus* L.).
- 1444* *Juncus polycephalus* Michx.
- 1658 *Leersia oryzoides* (L.) Sw.
- 770 *Lobelia puberula* Michx.
- 226 *Ludwigia alternifolia* L.
- 1448 *Melanthium virginicum* L.
- 1273 *Mentha piperita* L. (naturalized?).
- 98* *Nasturtium amphibium* Brown.
- 14 *Oxypolis rigidior* (L.) Coult. & Rose. (*Archemora rigida* DC.).
- 1223 *Pedicularis lanceolata* Michx. (*P. pallida* Pursh).
- 1140 *Phlox maculata* L.
- 703 *Polygonum amphibium* L.
- 699 *P. hydropiperoides* Michx. (*P. mite* Pers.).
- 97 *Radicula palustris* (L.) Moench. (*Nasturtium palustre* DC.).
- 56 *Ranunculus abortivus* L.
- 63 *R. delphinifolius* Torr. (*R. lucustris* Bk.).
- 971 *Rudbeckia laciniata* L.
- 724 *Rumex verticillatus* L.
- 1693 *Rynchospora glomerata* (L.) Vahl.
- 1391 *Sagittaria latifolia* Willd. (*S. sagittifolia* Willd.).

- 1392 *S. latifolia obtusa* (Muhl.) Robinson. (*S. obtusa* Willd.).
 729 *Saururus cernuus* L.
 183 *Saxifraga pennsylvanica* L.
 1679 *Scirpus validus* Vahl. (*S. lacustris* L.).
 950 *Senecio aureus gracilis* (Pursh) Britt. (*S. gracilis* Pursh).
 12 *Sium cicutæfolium* Schrank. (*Sium latifolium*).
 638* *Stellaria longipes* Goldie. (*S. palustris* Retz.).
 1511 *Typha angustifolia* L.
 1510 *T. latifolia* L.
 1185 *Veronica anagallis-aquatica* L.
 1186 *V. scutellata* L.
 1400* *Xyris caroliniana* Walt.

Plants of Ohio "Prairies," after Riddell, 1835.

- 669* *Acnida rusocarpa* Michx. (*Amarantus altissimus* Ridd.).
 670* *Amaranthus miamiensis* Ridd.
 397 *Amphicarpa monoica* (L.) Ell. (*A. comasa*).
 988 *Coreopsis tripteris* Willd.
 520 *Euphorbia dentata* Michx. (*E. heronii* Ridd.).
 1108 *Gentiana villosa* L. (*G. ochroleuca* Willd.).
 1220 *Gerardia auriculata* Michx.
 275 *Geum canadense* Jacq. (*G. album*).
 1426 *Habenaria psycodes* (L.) Sw. (*H. fissa* Brown).
 615* *Hudsonia ericoides* L.
 1134 *Ipomoea lacunosa* L. (*Convolvulus micranthus* Ridd.).
 1349 *Onosmodium hispidissimum* McK. (*O. hispidum* Michx.).
 1313 *Physostegia virginiana* Benth. (*Dracocephalum virginianum* L.).
 319 *Prunus americana* Marsh.
 1285 *Pycnanthemum flexuosum* (Walt.) BSP. (*P. linifolium* Pursh).
 286 *Rosa setigera* Michx. (*R. rubifolia*).
 625 *Silene regia* Sims.
 1008 *Silphium perfoliatum* L.
 1006 *S. trifoliatum* L. (*S. ternatum* L.).
 921 *Solidago riddellii* Frank.
 912* *S. stricta* Ait.
 1169 *Steironema lanceolatum hybridum* (Michx.) Gray. (*Lysimachia hybrida* Michx.).
 1453* *Stenanthium gramineum* (Ker.) Kunth. (*Veratrum angustifolium* Pursh).
 402 *Strophostyles helvola* (L.) Britt. (*S. diversifolius*).
 1065 *Viburnum prunifolium* L.

Plants of Ohio Swamps, after Riddell, 1835.

- 1520 *Acorus calamus* L.
 989 *Bidens trichosperma* (Michx.) Britt. (*Coreopsis trichosperma* Michx.).
 1417 *Calopogon pulchellus* (Sw.) R. Br.
 1711 *Carex folliculata* L.
 1724 *C. riparia* Curt. (*C. lacustris* Willd.).
 1127 *Convolvulus sepium pubescens* (Gray) Fernald. (*C. repens* L.).
 1678 *Eleocharis tenuis* (Willd.) Schultes. (*Scirpus tenuis* Willd.).
 1600 *Glyceria canadensis* (Michx.) Trin. (*Poa canadensis* Torr.).
 1599* *G. obtusa* (Muhl.) Trin. (*Poa obtusa* Muhl.).
 1198* *Gratiola aurea* Muhl.
 1440 *Juncus nodosus* L.
 1439* *J. setaceus* Rostk.
 1389 *Larix laricina* (DuRoi) Koch (*Pinus pendula* Ait.).
 1171 *Lysimachia thyrsiflora* L. (*L. capitata* Pursh).
 1537 *Muhlenbergia mexicana* (L.) Trin. (*Agrostis lateriflora* Michx.).
 530* *Polygala brevifolia* Nutt.
 562 *Rhus vernix* L.
 971 *Rudbeckia laciniata* L.
 1692 *Rynchospora alba* (L.) Vahl.

- 1688 *Scirpus lineatus* Michx. (*Tricophorum lineatum* Pers.).
 755 *Vaccinium corymbosum* L.
 602 *Viola striata* Ait. (*V. ochroleuca* Schw.).

Plants of Ohio Wet Prairies, after Riddell, 1835.

- 856 *Antennaria plantaginifolia* (L.) Richards. (*Gnaphaleum plantagineum* L.).
 1090 *Asclepias incarnata* L.
 1089 *A. incarnata* L. (*A. amoena* Willd.).
 1093* *A. michauxii* Dcne. (*A. angustifolia* Ell.).
 1738 *Aspidium thelypteris* (L.) Sw.
 869 *Aster novæ-angliæ* L.
 880 *A. puniceus* L.
 1000 *Bidens lævis* (L.) BSP. (*B. chrysanthemoides* Ell.).
 989 *B. trichosperma* (Michx.) Britt. (*Coreopsis trichosperma* Michx.).
 432 *Boehmeria cylindrica* (L.) Sw.
 1617 *Bromus purgans* L.
 940 *Cacalia suaveolens* L.
 1417 *Calopogon pulchellus* (Sw.) R. Br.
 767 *Campanula aparinoides* Pursh.
 1709 *Carex lurida* Wahl. (*C. tentaculata* Muhl.).
 1054 *Cephalanthus occidentalis* L.
 1203 *Chelone glabra* L.
 826 *Cirsium muticum* Michx. (*Carduus glutinosus* Bk.).
 1078 *Cornus paniculata* L'Herit.
 209 *Epilobium densum* Raf. (*E. lineare*).
 208* *E. palustre* L.
 8 *Eryngium aquaticum* L.
 930 *Eupatorium perfoliatum* L.
 297 *Filipendula rubra* (Hill) Robinson. (*Spiræa lobata*).
 1044 *Galium tinctorium* L. (*G. obtusum* Big.).
 1110 *Gentiana crinita* Froel. (*G. crinata* Willd.).
 1107 *Gentiana saponaria* L.
 1217 *Gerardia purpurea* L.
 1199 *Gratiola virginiana* L. (*G. virginica* L.).
 1425 *Habenaria fimbriata* (Ait.) R. Br.
 170 *Hypericum parviflorum* Willd.
 736* *Ilex lanceolatus* (Pursh) Chapm. (*Prinos lanceolatus* Pursh).
 407 *Lathyrus venosus* Muhl.
 1658 *Leersia oryzoides* (L.) Sw.
 1502 *Lilium canadense* L.
 773 *Lobelia kalmii* L.
 769 *L. siphilitica* L.
 772 *L. spicata* Lam. (*L. claytoniana* Michx.).
 1448 *Melanthium virginicum* L.
 1197 *Mimulus alatus* Ait.
 1537 *Muhlenbergia mexicana* (L.) Trin. (*Agrostis lateriflora* Michx.).
 1736 *Onoclea sensibilis* L.
 14 *Oxypolis rigidior* (L.) Coult. & Rose. (*Archemora rigida* DC.).
 193 *Parnassia caroliniana* Michx. (*P. americana*).
 1223 *Pedicularis lanceolata* Michx. (*P. pallida* Pursh).
 1517 *Peltandra virginica* (L.) Kunth. (*Lecontia virginica* Cooper).
 1140 *Phlox maculata* L.
 1314 *Physostegia virginiana* (L.) Benth. (*Dracocephalum variegatum* Vent.).
 1595 *Poa trivialis* L. (naturalized?).
 707 *Polygonum sagittatum* L.
 493 *Populus heterophylla* L.
 261 *Potentilla fruticosa* L.
 796 *Prenanthes racemosa* Michx.
 55 *Ranunculus pennsylvanicus* L.
 1392 *Sagittaria latifolia obtusa* (Muhl.) Robinson. (*S. obtusa* Willd.).
 481* *Salix discolor* Muhl. (*S. conifera*).
 480 *Salix petiolaris* Smith. (*S. rosmarinifolia*).

- 256 *Sanguisorba canadensis* L.
- 1331 *Scutellaria lateriflora* L.
- 950 *Senecio aureus gracilis* (Pursh) Britt. (*S. gracilis* Pursh).
- 920 *Solidago ohioensis* Ridd.
- 1651 *Sorghastrum nutans* (L.) Nash. (*Andropogon nutans* L.).
- 1645 *Spartina michauxiana* Hitchc. (*S. cynosuroides* Willd.).
- 292* *Spiraea salicifolia* L.
- 1413 *Spiranthes praecox* (Walt.) Wats. & Coult. (*S. tortilis* Rich.).
- 1167 *Steironema quadriflorum* (Sims) Hitchc. (*Lysimachia revoluta* Nutt.).
- 1168 *S. quadrifolia* L. (*L. quadrifolia* Sims).
- 47* *Thalictrum corynellum* DC. (*T. cornuti*).
- 834 *Vernonia fasciculata* Michx. (*V. corymbosa* Schw.).
- 1186 *Veronica scutellata* L.
- 591 *Viola affinis* Le Conte.
- 1400* *Xyris caroliniana* Walt.
- 1655* *Zizaniopsis miliacea* (Michx.) Doll. & Asch. (*Zizania miliacea* Michx.).

The present known distribution within Ohio of every species in each list has been studied. Those marked with an asterisk are of course not at present recorded as found in the state. Of the remainder, a number are of general distribution within Ohio. Of those whose distribution is restricted, however, practically all are limited to those counties which are shown in Fig. 1 of this paper to have contained treeless areas of one sort or another.

No discussion of prairies in North America can be completed without mention of the thorough annotated bibliography of Shimek (18). To the papers cited there the reader is referred for many interesting accounts of the early grasslands. Moreover, in them may be followed the development of theory regarding the ecological significance of grasslands.

It has become somewhat common to speak patronizingly of early attempts to formulate an adequate theory. This is unjust. The first attempts, it must be remembered, preceded our knowledge of glacial physiography, meteorological data on a wide scale, rapid transit, photography, scientific plant geography, and physiology of water relations. One by one, as the current state of knowledge permitted, the locally limiting factors responsible for the absence of trees were perceived by the early naturalists until the whole formed a consistent unit. The broad outlines of this resultant conception have not been seriously modified by modern technical studies. Bourne's wise appraisal of the situation in Ohio, written in 1819 (19) and the judicious summary by Newberry in 1873 (20) deserve to be remembered.

SUMMARY AND CONCLUSIONS.

1. The foregoing paper attempts to locate and characterize all of the so-called "prairies" of Ohio which were a part of the native vegetation and of which any record has been found. These areas appear as prairies, wet prairies, dry prairies, bogs, oak openings, barrens, and swamps, all more or less associated.

2. These regions relate themselves obviously to physiography. In general they represent areas of inadequate drainage or actual ponding consequent upon glacial outwash near the apices of the various morainal lobes. Within the Erie Basin they mark the ancient shore lines. There seems to be a sufficiently close relation between preglacial topography and the position of the glacial moraines to bring a large proportion of the prairies within the silted valleys of preglacial drainage lines.

3. By use of nontechnical contemporary descriptions an attempt is made to reconstruct the physiognomy of the original prairies. Apart from bog meadows most of them were wet, displaying variously *Juncus*, *Scirpus*, *Typha*, *Phragmites*, *Spartina*, *Calamagrostis* and *Andropogon furcatus*, as well as numerous dicotyledonous herbs. Sometimes elm, ash, willow were conspicuous invaders. In other cases there was a dryer herbaceous border dominated by *Andropogon scoparius* with various composites, etc. Between this and the oak-covered uplands was frequently a shrub zone of plum, hazel, and wild rose. Still higher were open groves of oak and hickory.

4. A floristic reconstruction of the various types of prairie has been made upon the basis of Riddell's Early Western Flora.

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